WA 6906
5-23-86
5a

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION X
1200 Sixth Avenue
Seattle, Washington 98101

In the Matter of: ENVIRONMENTAL PROTECTION AGENCY, Complainant, v. PACIFIC WOOD TREATING CORPORATION, EPA ID No. WAD009036906, Respondent.	No. 1085-09-26-3008P AFFIDAVIT OF PATRICK H. WICKS

Patrick H. Wicks, having been duly sworn on oath, deposes and says:

1. I am currently a self-employed consulting environmental engineer, specializing in hazardous waste management, soil and ground water contamination. I have a Bachelor of Science degree in Chemical Engineering from the University of Idaho; and I am a licensed professional engineer in the State of Oregon. I have worked full time during the past 15 years in the hazardous waste and environmental area.

During the last 3 years alone, I have consulted on over 30 projects involving hazardous waste, soil and/or groundwater contamination due to hazardous materials or wastes, the cleanup of such

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contamination, other evaluations involving hazardous materials/ wastes in the environment or compliance with applicable statutes and regulations.

Previous to my current employment, I was involved in hazardous waste management with the Oregon Department of Environmental Quality. Subsequently, I managed the operations of hazardous waste treatment and disposal facilities and was involved in the development of similar new facilities for Chem-Security Systems, Inc. and Chem-Nuclear Systems, Inc. My resume and descriptions of recent consulting activities are attached.

2. In June, 1983, I was retained by Pacific Wood Treating Corporation ("PWT") to prepare a closure and post-closure plan for the Ridgefield Brick and Tile Facility ("the RBT site") near Ridgefield, Washington. I am personally familiar with the RBT site and the history of its operation and closure. In the preparation of these plans, I consulted with the firm of Sweet, Edwards & Associates, which had been retained by PWT to provide geotechnical services.

Preliminary Ground Water Investigation

3. In response to a notice of violation from EPA Region 10, PWT initiated an evaluation of groundwater at the RBT site in May, 1983. This evaluation was prepared by Sweet, Edwards and completed June 7, 1983. The report resulting from this evaluation was forwarded to the Washington Department of Ecology ("DOE") for comment on the same day.

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Preparation of Draft Closure Plan

4. The DOE June 20, 1983 Notice of Penalty and Order #83-284 required PWT to submit a closure plan. This order also required that a post-closure plan be prepared. These plans were to be submitted by July 30, 1983. The DOE Order further requested submission of a groundwater monitoring plan by July 11, 1983. The Draft Closure Plan, Post-closure Plan and a Groundwater Monitoring Plan were completed July 15, 1983. These plans were submitted to the DOE on that same day; and copies were forwarded to Region 10.

5. The Draft Closure Plan contained three options for closure. Although there were some minor differences among the three options, all options included soil testing, drying the then-existing pond, construction of a top seal over the waste, installation of vents, final grading, monitoring lysimeters, seeding the top seal and fencing as common features. The major differences among the options were as follows. Option I, in addition to the common features noted above, essentially provided for placing a low permeability barrier constructed of onsite compacted soils along the southeast face of the refuse area, where it abutted the then-existing pond. Option II was more rigorous than Option I, in that a compacted soil cutoff wall approximately 11 feet deep was to be added along the remaining perimeter of the refuse area, in conjunction with the compacted soil barrier along the southeast face of the refuse area. Option III was more rigorous than Options I and II, since it provided for complete relocation of the waste onto a new bottom seal (to mitigate leachate migration), installation of

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an underdrain system (to further protect groundwater) and installation of a toe drain (as a leachate control feature and additional monitoring point).

6. DOE commented on the Draft Closure and Post-closure plans in a letter dated August 4, 1983. EPA's comments were incorporated into a letter to Eric Egbers dated August 10, 1983. Subsequently, a meeting was held on August 18, 1983 at the Olympia offices of the DOE. This meeting was attended by representatives of DOE, EPA, PWT and PWT's consultants, Sweet, Edwards and the undersigned. During this meeting, the DOE and EPA comments on the Closure and Post-closure Plans were discussed. Revisions of the draft plan to achieve an acceptable closure were agreed upon. It was also agreed that changes to the plans would be provided in the form of an Addendum, covering agreed-upon modifications. The regulatory agencies were anxious that construction could begin as soon as DOE approval of the Draft Closure Plan and Addendum had been received, in order to complete closure in 1983, prior to the onset of fall rains.

DOE Approval

7. An Addendum to the Draft Closure Plan was completed on August 22, 1983. This Addendum was submitted to the DOE on August 24, 1983. It addressed closure, post-closure and the groundwater monitoring provisions. On August 31, 1983, a meeting was held at PWT's Ridgefield facility. This meeting was attended by DOE and PWT representatives to review various items of the Addendum. The DOE representative, Eric Egbers, verbally authorized proceeding

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with closure during this meeting, in accordance with the plans and discussions that day. He also indicated that approval of the plans would be confirmed by a DOE order. Of the three options proposed for closure, Option III, with modifications as reflected in the Addendum, was selected by DOE. Option III was carried out during the closure, as further described below.

8. On October 26, 1983, the DOE issued Order #83-468. This Order approved the Draft Closure Plan and Addendum with certain conditions which related principally to sampling, testing, monitoring and post-closure performance standards for the results of sampling and testing.

Closure Construction

9. Closure construction was started September 8, 1983 and completed October 16, 1983. Major activities during closure are described below in approximate chronological order. A necessary prelude to closure was evacuation of water from the then-existing pond in the former clay pit at the site. This step is also described below.

The topography, location of waste disposed (refuse area) and other features of the site prior to closure are shown in Attachment A. Topography, location of the new waste encapsulation area (refuse area) and other features of the site following closure are shown in Attachments B and C.

Pond Evacuation

10. Previous excavation of clay by RBT at the property had created a pit near the southeast corner of the site. A small part

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of this pit had been filled with waste from PWT's plant. The larger portion of this pit was a pond. During the preliminary groundwater investigation described above, water in this pond was sampled on May 31, 1983 and analyzed. Results of those analyses showed this water to be essentially uncontaminated. Fish, tadpoles and frogs were also observed in the pond during this sampling.

11. Prior to closure construction, it was necessary to dry the pond due to certain provisions of all closure options under consideration, i.e., in Option III, the pond area was to be used as the new waste encapsulation area. No water would be allowed to accumulate in the pond for two weeks before closure construction commenced. On July 7, 1983, evaporation/evacuation of water in the pond was initiated, in accordance with procedures approved by DOE.

Geotechnical Investigations and Chemical Analysis

12. Closure construction was initiated on September 8, 1983. Three bore holes, P-1, P-2 and P-3, were excavated in the former pond area to define the depth of the mica sand underlying this area and the depth to the cemented gravels. Test pits TP-1 and TP-2 were excavated to determine the quality of soil to be used for the compacted and clay-amended seal and in the various portions of closure construction.

13. In addition to proposals in the Draft Closure Plan and the Addendum, the DOE requested additional soil samples be collected adjacent to the preclosure waste area. The purpose of this

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sampling was to obtain samples for chemical analysis to determine the chemical contamination levels of soil adjacent to, and as an indicator of migration of contaminants from, the refuse area. Accordingly, three additional borings, AH-1, AH-2 and AH-3, were advanced to obtain samples immediately adjacent to and below the then-existing refuse area. These samples were analyzed to confirm that migration of contaminants had not occurred from the old refuse area.

14. An additional auger hole, AH-4, was excavated near the southeast corner of the site. A lysimeter was installed in AH-4 as the upgradient onsite monitoring point. During closure construction, this lysimeter was damaged and was later replaced with a new lysimeter at a slightly different location.

All borings, sampling and test pits were completed by September 14, 1983.

15. A lysimeter is a monitoring device used for collecting ground water samples, usually in relatively shallow applications of less than 60 feet below the ground surface. The lysimeter body is a section of plastic pipe, commonly 1.5 to 2 inches in diameter. At the lower end of the body is a porous ceramic cup of the same diameter. At the upper end of the body is a seal or stopper through which two small diameter tubes run into the lysimeter body. One of these tubes extends to the porous ceramic cup at the lower end of the lysimeter. The other tube extends only slightly into the lysimeter body.

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Using lysimeters for collection of groundwater samples is accomplished by drawing a vacuum on the unit through the two small diameter tubes which extend above the ground surface and clamping these tubes to maintain the vacuum for a period of usually days or weeks. During this period, the vacuum causes any water present near the lysimeter to be drawn through the porous ceramic cup into the lysimeter. This water can then be brought to the surface by placing air pressure on one of the small diameter tubes and collecting the sample from the other tube.

Details of lysimeter installation at the RBT site are shown in Attachment D.

Underdrain

16. An underdrain system was installed beneath the bottom seal for the new waste encapsulation area (refuse area in Attachment B) prior to its construction. The underdrain provides a monitoring system and addresses any concern over the potential upwelling of seasonally perched groundwater beneath the bottom seal. The underdrain option was discussed with Eric Egbers of the DOE and approval was given to Randy Sweet of Sweet, Edwards to install the system as described.

17. The underdrain system installed consisted of two 4-inch perforated pipes in 2 ft x 2 ft trenches with washed gravel backfill. These pipes were aligned in a "V". At the apex of the V, the pipes were connected together. These were in turn connected to a new underground solid pipe (tight line) which terminated at a sump located at the southwest corner of the warehouse. This sys-

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tem provides positive gravity drainage beneath the bottom seal. Any flow from the underdrain can be measured at the sump. Samples of water flowing from the underdrain can also be collected at the sump for analysis.

Bottom Seal

18. After completion of the underdrain system, the bottom seal was constructed in the former pond area. The area covered by this bottom seal is represented by the shaded refuse area in Attachment B. The Draft Closure Plan had provided for a compacted soil bottom seal. The Addendum added a requirement for the top portion of the seal to be a bentonite clay-amended compacted soil. The base of the bottom seal was constructed of compacted low permeability soils approximately 3 feet thick. On top of this soil base, a bentonite clay-amended compacted soil seal approximately 4 inches thick was constructed. This upper part of the bottom seal was constructed of low permeability onsite soils, amended with bentonite clay to achieve 1×10^{-7} centimeters per second coefficient of permeability. The upper part of the bottom seal was completed in three sections. As constructed, the bottom seal provides a barrier to the downward migration of leachate from the cell. Leachate collecting above the bottom seal will preferentially migrate or drain to the toe drain at the West end of the new waste encapsulation area. This further protects against leachate migrating through the bottom seal. As an additional protective feature, the underdrain provides a means to monitor any small proportion of leachate which might migrate through the bottom seal,

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as well as monitoring shallow ground water below the bottom seal and protecting the bottom seal from the possibility of upwelling of shallow ground water.

Waste Relocation

19. Waste movement onto the first two of three sections of the upper bottom seal was initiated prior to completion of the third and final section of the upper bottom seal. Following completion of the third section of the upper bottom seal, waste relocation from the former refuse area was completed. Excavation of the waste and movement onto the new bottom seal was accomplished using a large back hoe and crawler tractor.

Confirmation of Waste Removal

20. The addendum provided for chemical analyses on the soil underlying the former waste disposal area following waste relocation to the new encapsulation area. However, as a result of a soil sampling and testing conducted at the site (as described above), there appeared to be no significant contamination immediately below the waste in the former disposal area. DOE agreed, therefore, that further chemical testing of the soil immediately below the old disposal area was not necessary and that visual observation could be used to determine when all wastes had been removed therefrom. Visual observations by PWT and its consultants during and near the end of the waste removal process revealed a dramatic difference in color between the wastes and the underlying soil. These visual observations proved to be a practical and ef-

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fective method of determining completion of waste removal and the limits of necessary excavation.

Toe Drain

21. Following movement of waste to the new encapsulation area, and placement of soil over the waste for surcharge, a toe drain was constructed at the western boundary of the waste cell. The purpose of this toe drain is to collect water from the waste cell which would occur principally due to precipitation infiltrating through the top cover and into the waste cell. The toe drain consisted of perforated pipe installed in a gravel-filled trench, in contact with the waste. At the approximate center of the toe drain, a distribution box was provided with a vertical riser so that samples of water (leachate) could be collected at this point. The distribution box was also connected with an underground solid pipe (tight line) to a sump located at the southwest corner of the warehouse. This allowed for gravity drainage of leachate from the toe drain. Flow from the toe drain could be measured at the sump. The sump also provides an alternate sampling location.

Final Cap, Cover and Grading

22. During and following completion of the toe drain, low permeability soil from the site was placed over the waste cell and compacted in accordance with the plans. The depth of this compacted top cap was 18 inches. Following completion of this 18-inch top cap, a second 18-inch layer of top soil was added to the new waste cell area and to adjacent areas of the site. Final grading of this site was then completed.

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Vents, Seeding and Fencing

23. Vents were installed near the eastern boundary of the new waste cell. A shallow drainage ditch was excavated along the eastern, northern and southern boundary of the new encapsulation area. Seeding of the site was then completed. A three-strand, barbwire fence was constructed along the western and northern boundary of the new waste cell. The DOE had agreed to allow the existing electrical fence along the southern and eastern property line and waste cell boundary to remain in place at that time.

Lysimeter Monitors

24. Lysimeters for monitoring groundwater were installed as follows: LS-1 was installed September 12, 1983. This is the upgradient lysimeter located near the southeast corner of the property. LS-2 and LS-3 were completed September 28, 1983. These downgradient lysimeters are located west of the new waste cell. LS-1 was damaged during grading and other construction activities on the site in the latter half of September. This lysimeter was replaced slightly to the north of its original location.

Certification

25. Certification of closure of the RBT site is provided in a report. This certification report describes the consultants' inspections during closure construction, modifications to the closure plans, provides formal certification of closure and provides various other materials relative to closure: site safety and operations plan, site exploration plans, boring logs, soil sampling data sheets, laboratory analysis results, access agreement for

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drinking water well sampling, report on testing of bentonite-amended bottom seal, soil logs, site topography, color photograph reproductions and references.

Final inspection for purposes of certification was conducted at the site November 16, 1983. The formal report on certification was completed February 15, 1984. This report was submitted by PWT to DOE on May 31, 1984. PWT's certification was submitted on the same date.

Post-Closure

Monitoring

26. Following completion of closure construction, post-closure environmental monitoring of the site was started as required by the approved plans. Other monitoring has also been performed by PWT on its own initiative.

Monitoring of potential groundwater contamination has consisted of sampling and testing of water from:

a. The three lysimeters installed at the site during closure.

b. Three downgradient drinking water wells located near the site and one upgradient drinking water well.

c. Flow from the toe drain.

d. Flow from the underdrain.

Hazardous constituents that might be associated with the ash disposed at the RBT site were those potentially present in the wood treating sludge prior to its incineration. These include creosote, pentachlorophenol, arsenic, copper and chromium.

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Parameters to be analyzed during post-closure monitoring were based on those listed in 40 CFR 265.92, plus three others not covered by Part 265 which are indicative of wood treating waste: copper, pentachlorophenol and naphthalene (a major constituent of creosote). Likewise, arsenic and chromium (which are included in the 40 CFR 265 list) would be indicative of wood treating waste constituents.

40 CFR 265.92 lists the following parameters for groundwater monitoring:

a. Drinking water parameters: arsenic, barium, cadmium, chromium, fluoride, lead, mercury, nitrate (as N), selenium, silver, endrin, lindane, methoxychlor, toxaphene, 2,4-D, 2,4,5-TP silvex, radium, gross alpha, gross beta, turbidity, coliform bacteria;

b. Groundwater quality parameters: chloride, iron, manganese, phenols, sodium, sulfate;

c. Groundwater contamination parameters: pH, specific conductance, total organic carbon, total organic halogen.

Using the 40 CFR 265 parameters as a starting point, parameters appropriate to post-closure monitoring at the site after closure were discussed among DOE, EPA, PWT and its consultants on several occasions. As a result of these discussions, several parameters were eliminated early on from the 40 CFR 265.92 list as not appropriate or necessary for monitoring at the RBT site. Others were eliminated later. Two slightly differing sets of groundwater monitoring parameters were proposed in the draft closure plan and

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the Addendum. Both sets were based on the 40 CFR 265.92 list. Eventually, the parameters to be tested during post-closure were refined and established in the DOE October 1983 Order. The laboratory analysis parameters for groundwater monitoring which were finally established in the DOE October 1983 Order are listed below.

The monitoring program required by the Addendum, as modified by the October 1983 Order, includes quarterly sampling and analysis of the toe drain, the three lysimeters and four drinking water wells in the first year after closure. After one year of quarterly monitoring, annual sampling and analysis was required. Laboratory analysis parameters included: arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, copper, pentachlorophenol and naphthalene. Some samples have been tested for total phenols, pH and specific conductance, although these parameters are not required by the Order.

Performance standards for several parameters were established for all wells, lysimeters and the toe drain in the October 1983 Order. These standards, expressed as parts per million (ppm), are as follows: 0.025 ppm arsenic, 0.5 ppm barium, 0.005 ppm cadmium, 0.025 ppm chromium, 0.025 ppm lead, 0.001 ppm mercury, 0.005 ppm selenium, 0.025 ppm silver, 0.5 ppm copper, 0.025 ppm pentachlorophenol and 1.15 ppm naphathalene. These were established at one-half the EPA primary or secondary drinking water standards or one-half the acute freshwater aquatic life toxicity criteria. The Order required that, if any of these standards were exceeded, du-

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plicate samples must be tested. Performance standards for several parameters were established for the toe drain, as follows: 0.05 ppm arsenic, 0.003 ppm pentachlorophenol and 0.62 ppm naphthalene.

27. Analytical results for the required post-closure monitoring of lysimeters (i.e. shallow groundwater), water wells (local drinking water supply) and the toe drain (leachate) have not exceeded the performance standards for any of the samples. These results indicate no contamination of groundwater or surface water in excess of the performance standards is occurring. Additionally, although testing of the underdrain was not required, it was sampled and tested in December, 1985 for the same parameters. Analytical results from this sample did not exceed the performance standards, further indicating that contamination in excess of the performance standards is not occurring.

28. In several respects, the groundwater monitoring system installed at the RBT site is superior to the 40 CFR 265 groundwater monitoring requirements. These include:

a. Monitoring of the toe drain provides a direct and rapid indication of the potential for contaminants in leachate from the new waste encapsulation area to migrate to groundwater or to surface water at the site.

b. Monitoring of the underdrain provides a rapid indication of whether shallow groundwater beneath the new waste encapsulation area is being contaminated. This underdrain monitoring provides a direct measure of any contaminant leakage through the bottom seal.

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Monitoring of the three onsite lysimeters enhances shallow groundwater monitoring capability.

c. Monitoring of nearby drinking water supply wells provides an indication of whether local drinking water is being contaminated. Monitoring of drinking water supply wells is not required in 40 CFR 265. Monitoring of these wells was included in the plans as an additional backup to assure no adverse impact on beneficial use of groundwater.

None of these factors would be addressed nearly as well by the 40 CFR 265 requirement of one upgradient and three downgradient groundwater monitoring wells in the uppermost aquifer. A 40 CFR 265 monitoring system will indicate contamination after groundwater has already become contaminated, but will not detect the potential for contamination prior to its occurrence. By contrast, the system installed at the RBT site will detect contamination potential prior to the occurrence of groundwater contamination. Further, the system at the RBT site monitors the quality of the local drinking water supply, which would not be accomplished by a 40 CFR 265 monitoring system.

DOE and EPA Inspections

29. Inspection of the site following completion of closure was conducted by DOE on December 14, 1983. This inspection was to observe first quarterly sampling by Sweet, Edwards. Samples were also split with DOE. Present during this inspection were Eric Egbers of DOE, Sweet, Edwards representatives and PWT representatives.

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30. On June 12, 1984, a groundwater monitoring compliance audit was conducted at the site by EPA Region 10 representatives, an EPA consultant and DOE personnel. Also present during this inspection were Sweet, Edwards and PWT representatives. This audit coincided with the collection of the third quarterly monitoring samples by PWT's consultants. PWT received no information from either DOE or EPA that either agency had any concern over the closure or post-closure care of the RBT site.

Patrick H. Wicks

SUBSCRIBED AND SWORN to before me this 23 day of May, 1986.

Notary Public in and for the State of Washington, residing at Des Moines WA
My Commission Exp. 3-1-87

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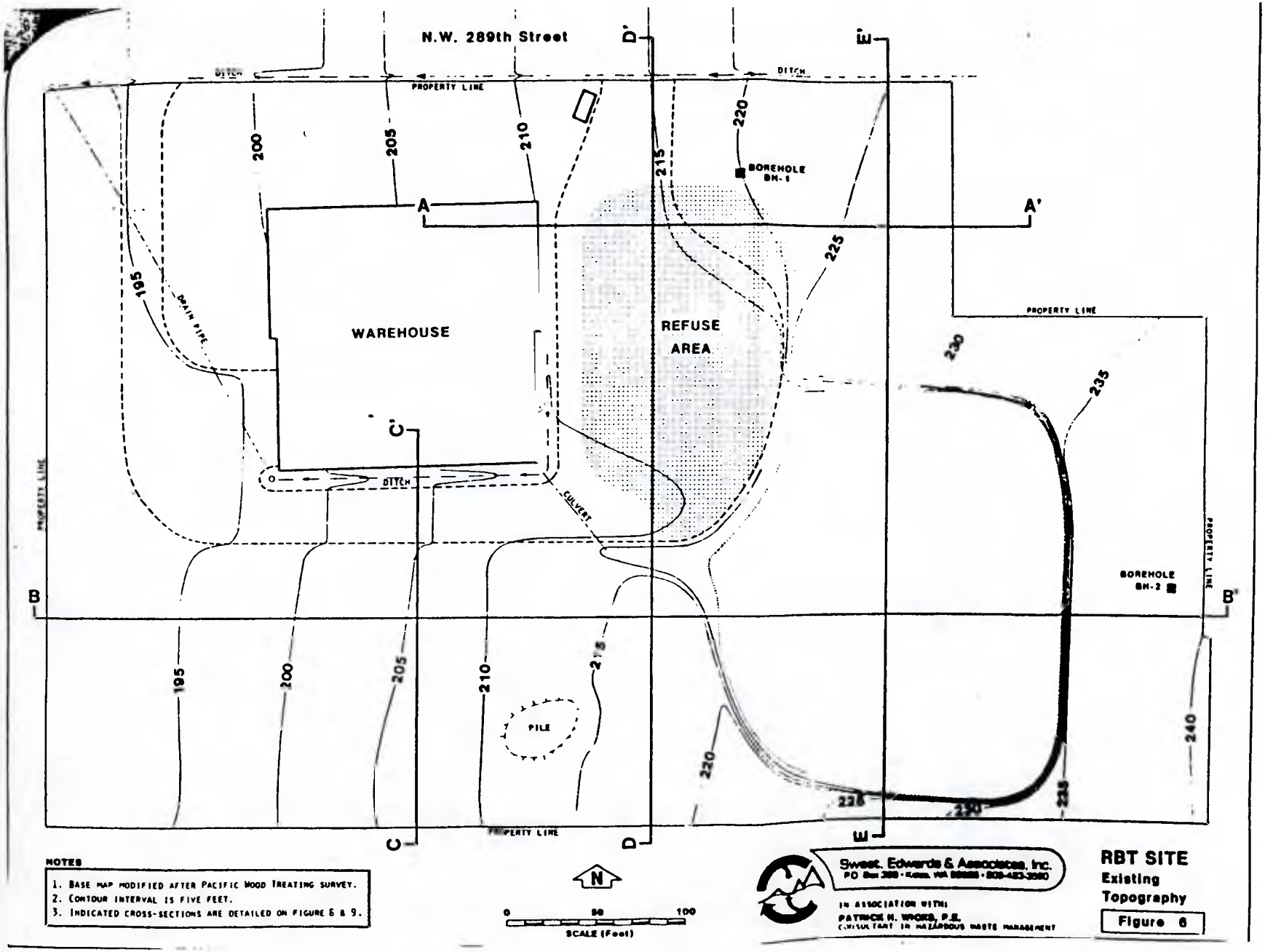
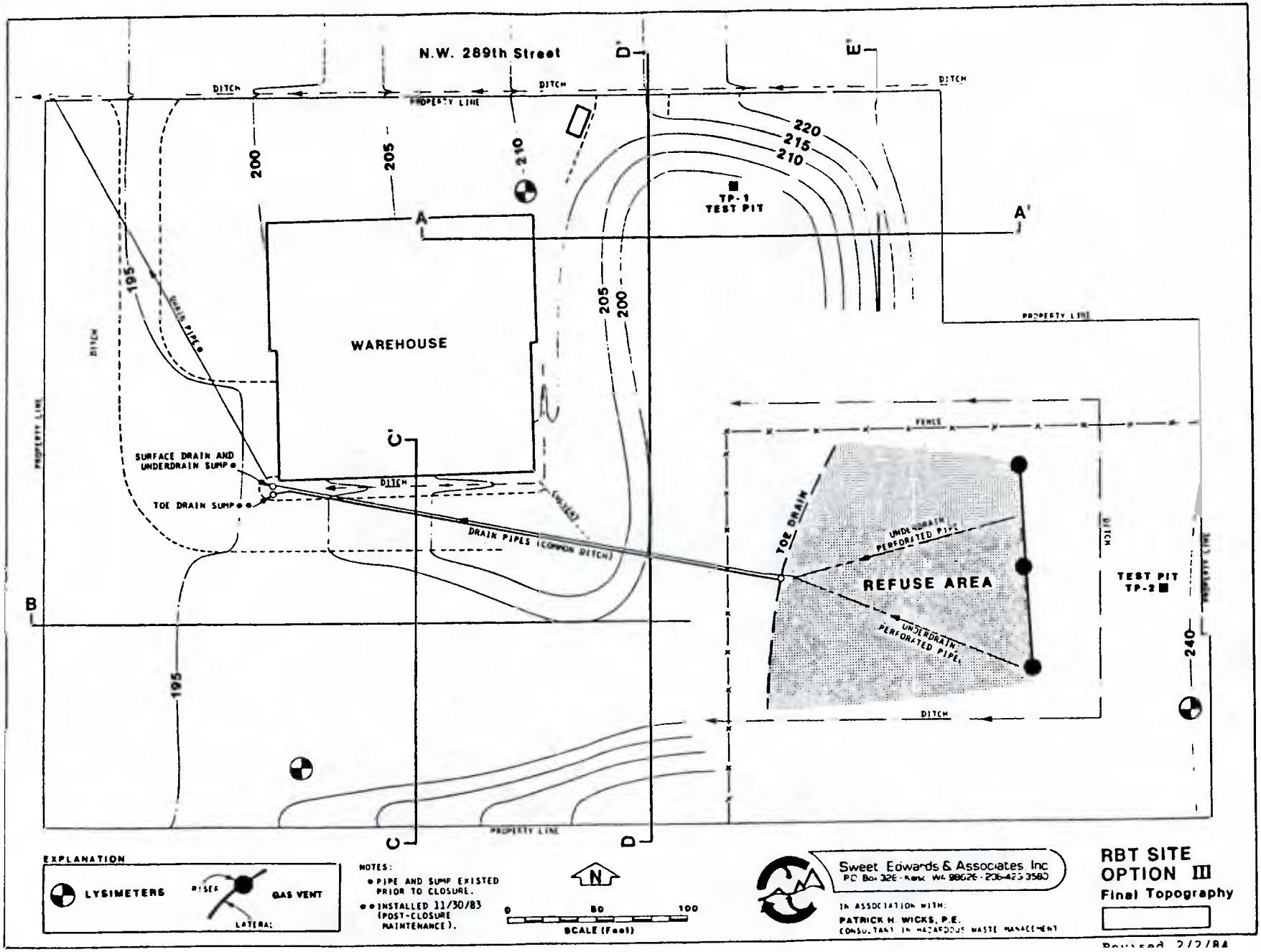
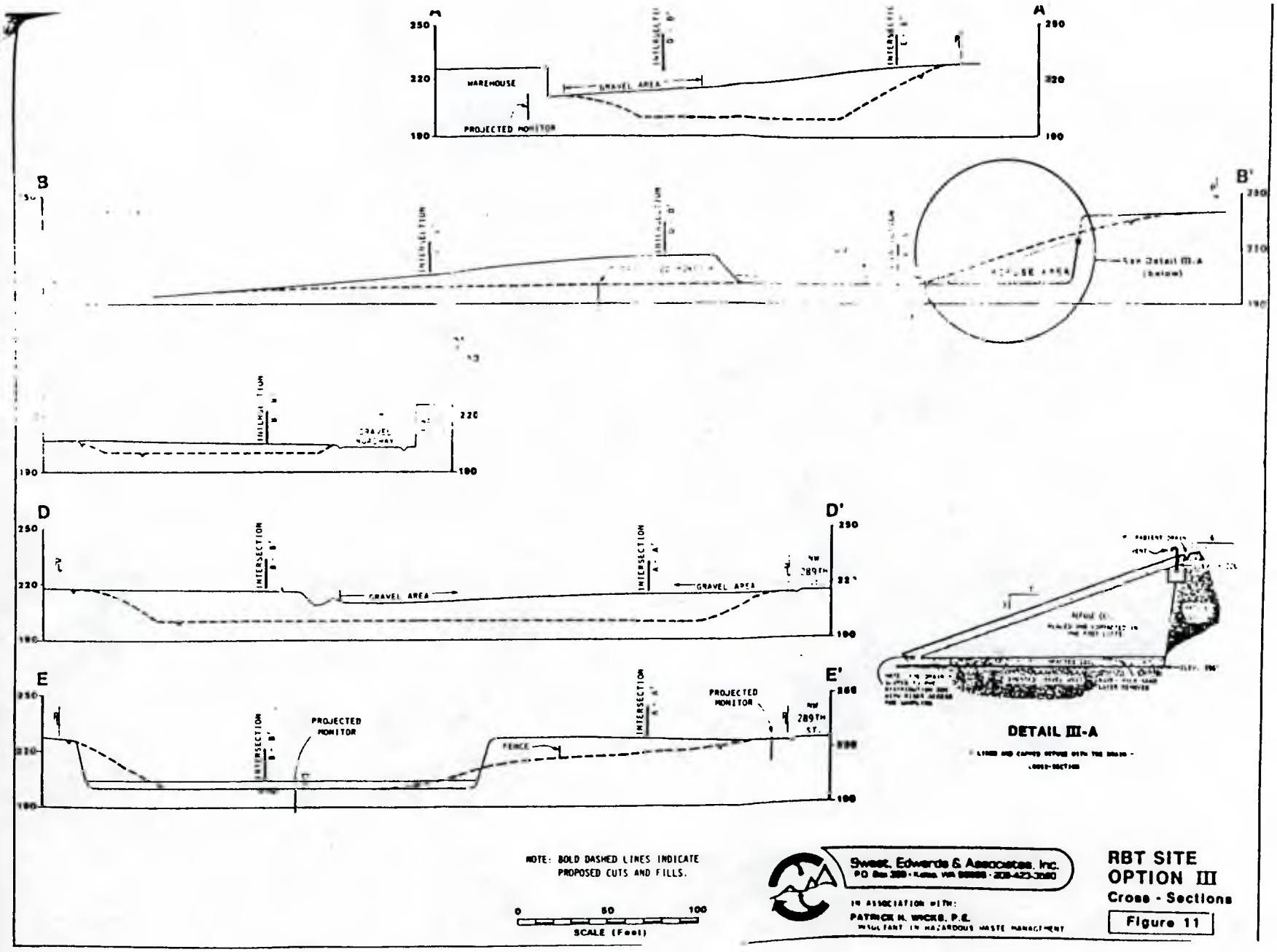

N.W. 289th Street
PROPERTY LINE
DITCH
WAREHOUSE
REFUSE AREA
BOREHOLE BH-1
BOREHOLE BH-2
DRAIN PIPE
CULVERT
PILE
A
A'
B
B'
C
C'
D
D'
E
E'
195
200
205
210
215
220
225
230
235
240
NOTES
1. BASE MAP MODIFIED AFTER PACIFIC WOOD TREATING SURVEY.
2. CONTOUR INTERVAL IS FIVE FEET.
3. INDICATED CROSS-SECTIONS ARE DETAILED ON FIGURE 8 & 9.
N
0
50
100
SCALE (Feet)
Sweet, Edwards & Associates, Inc.
IN ASSOCIATION WITH:
PATRICK H. WORKS, P.E.
CONSULTANT IN HAZARDOUS WASTE MANAGEMENT
RBT SITE
Existing
Topography
Figure 6


N.W. 289th Street
DITCH
PROPERTY LINE
D'
E'
220
215
210
200
205
TP-1
TEST PIT
A
A'
WAREHOUSE
195
SURFACE DRAIN
SURFACE DRAIN AND UNDERDRAIN SUMP
TOE DRAIN SUMP
DRAIN PIPES (COMMON DITCH)
B
C
C'
D
FENCE
TOE DRAIN
UNDERDRAIN PERFORATED PIPE
REFUSE AREA
TEST PIT
TP-2
240
EXPLANATION
LYSIMETERS
RISER
GAS VENT
LATERAL
NOTES:
* PIPE AND SUMP EXISTED PRIOR TO CLOSURE.
** INSTALLED 11/30/83 (POST-CLOSURE MAINTENANCE).
N
0
50
100
SCALE (Feet)
Sweet Edwards & Associates Inc
P.O. Box 328 · Kent, WA 98626 · 206-423-3580
IN ASSOCIATION WITH:
PATRICK H. WICKS, P.E.
CONSULTANT IN HAZARDOUS WASTE MANAGEMENT
RBT SITE
OPTION III
Final Topography
Revised 2/2/84


A
A'
250
220
190
WAREHOUSE
GRAVEL AREA
PROJECTED MONITOR
B
B'
GRAVEL ROADWAY
D
D'
INTERSECTION
GRAVEL AREA
NW 289TH ST.
E
E'
PROJECTED MONITOR
FENCE
DETAIL III-A
NOTE: BOLD DASHED LINES INDICATE PROPOSED CUTS AND FILLS.
0
50
100
SCALE (Feet)
Sweet, Edwards & Associates, Inc.
IN ASSOCIATION WITH:
PATRICK M. WICKS, P.E.
RBT SITE
OPTION III
Cross - Sections
Figure 11

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT Pacific Wood Treating / RBT Site **Page** 1 **of** 1

Location Ridgefield Brick & Tile **Boring No.** LS-1

Surface Elevation _____ **Drilling Method** Auger

Total Depth 54.5 ft. **Drilled By** Sweet, Edwards & Assoc.

Date Completed 9/12/83 **Logged By** J. Maul

WELL DETAILS	PENETRATION TIME/ RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERMEABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
Bentonite Pellets; Native Soil Backfill; Suction Lines; 1.5 in. PVC riser; Betonite Pellets; Suction Lysimeter; Native Soil Slurry		10 20 30 40 50 60 70	4-1A 4-1B 4-2A 4-2B				43.5'-45.25' SILTY SAND- Tanish orange, lenses of feldspathic mica sand, medium fine, unsaturated. 52.0'-54.25' SAND- Orange and tan streaks, heavily oxidized, trace silt. Gravels at 54.5'. Auger refusal. Suction lysimeter installed at 52.0'.	